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ABSTRACT:

PROBLEM TO BE SOLVED: To prevent the deterioration of an image quality in the case of providing a low speed mode as transfer paper feeding speed.

SOLUTION: Elapsed time from a vertical synchronizing signal needed until the top end 75 of a primary transferred toner image 74 on an intermediate transfer belt 31 reaches the position of an upstream side in a rotating/driving direction 71 from a primary transfer part 14 by a distance L1 by which it is advanced in the total time (T4+T5) of time T4 needed for the belt 31 so as to decelerate from first speed S1 to second speed S2 and time T5 needed so as to stabilize at the second speed S2 is previously calculated, and a value obtained by deducting the known time (T4+T5) from the elapsed time is stored

as

specified time T3 in a ROM. Thus, the top end 75 of the primary transferred

toner image 74 reaches the primary transfer part 14 at the point in time t7

when the intermediate transfer belt 31 is stably driven at the circumferential

speed of the second speed S2.

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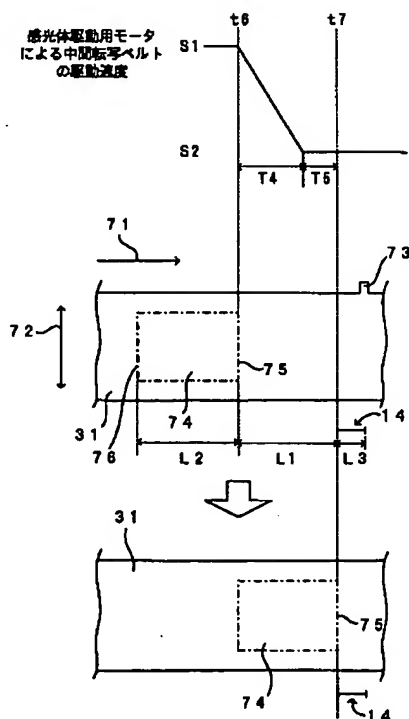
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(54)【発明の名称】 画像形成装置および方法

(57)【要約】

【課題】 転写紙搬送速度として低速のモードを備える場合において、画質の低下を防止する。

【解決手段】 第1速度S1から第2速度S2まで低下するのに要する時間T4と第2速度S2で安定するのに要する時間T5との合計時間(T4+T5)に進む距離L1だけ、中間転写ベルト31上の1次転写トナー像74の先端75が、1次転写部14から回転駆動方向71の上流側の位置に到達するのに要する垂直同期信号からの経過時間を予め求めておき、この経過時間から既知の時間(T4+T5)を減算した値を所定時間T3としてROMに記憶しておく。これによって、中間転写ベルト31が安定して第2速度S2の周速で駆動される時点t7に、1次転写トナー像74の先端75が1次転写部14に到達する。



【特許請求の範囲】

【請求項1】 感光体に形成された静電潜像にトナーを付着させてトナー像を形成する現像手段と、回転して1次転写部および2次転写部を循環的に通過する中間転写媒体と、前記1次転写部において前記中間転写媒体に前記トナー像を1次転写する1次転写手段と、前記2次転写部において前記中間転写媒体上の1次転写トナー像を転写紙に2次転写する2次転写手段と、前記転写紙を搬送しつつ前記転写紙上の2次転写トナー像を当該転写紙に定着する定着手段とを備えた画像形成装置において、

転写紙を第1速度で搬送する通常モードと、転写紙を少なくとも前記2次転写部から定着終了まで前記第1速度より低い第2速度で搬送する低速モードとを有する搬送制御手段と、
前記通常モードのときは前記中間転写媒体を前記第1速度で駆動し、前記低速モードのときは前記中間転写媒体を少なくとも前記現像手段によるトナー像形成終了までは前記第1速度で駆動するとともに、トナー像形成終了後に前記中間転写媒体の駆動速度を低下させ、少なくとも2次転写終了まで前記中間転写媒体を前記第2速度で

駆動するように制御を行う中間転写媒体制御手段と、
前記低速モードのときは、前記1次転写部における1次転写の終了後、直後に通過する前記2次転写部では前記1次転写トナー像の2次転写を行わず、前記1次転写トナー像が前記1次転写部を再通過した後、次に通過する前記2次転写部において前記1次転写トナー像の2次転写を行わせる転写制御手段とを備え、
前記中間転写媒体制御手段は、前記低速モードのときには、前記1次転写部における1次転写の終了後、前記1次転写トナー像が前記1次転写部を再通過する際に、その1次転写トナー像の先端が前記1次転写部に到達した時には前記中間転写媒体を前記第2速度で駆動していることを特徴とする画像形成装置。

【請求項2】 前記中間転写媒体制御手段は、前記1次転写トナー像の先端が前記第1転写部に到達した時点で、前記中間転写媒体が前記第2速度で安定して駆動されるように、前記第1速度から第2速度への減速開始時点を制御するものであることを特徴とする請求項1に記載の画像形成装置。

【請求項3】 前記中間転写媒体制御手段は、前記1次転写トナー像の先端が、前記第1速度から第2速度への減速開始時点から前記第2速度で安定する時点までに前記中間転写媒体の進む距離だけ前記第1転写部から回転駆動方向の上流側の位置に到達した時点で、前記第1速度からの減速を開始させるものであることを特徴とする請求項1に記載の画像形成装置。

【請求項4】 感光体に形成された静電潜像にトナーを現像手段により付着させて形成されるトナー像を、回転する中間転写媒体に1次転写部において1次転写し、その中間転写媒体上の1次転写トナー像を2次転写部にお

いて転写紙に2次転写し、その転写紙を搬送しつつ転写紙上の2次転写トナー像を当該転写紙に定着するようにした画像形成方法において、

転写紙を第1速度で搬送する通常モードと、転写紙を少なくとも前記2次転写部から定着終了まで前記第1速度より低い第2速度で搬送する低速モードとを有し、
前記通常モードのときは前記中間転写媒体を前記第1速度で駆動し、前記低速モードのときは前記中間転写媒体を少なくとも前記現像手段によるトナー像形成終了までは前記第1速度で駆動するとともに、トナー像形成終了後に前記中間転写媒体の駆動速度を低下させ、少なくとも2次転写終了まで前記中間転写媒体を前記第2速度で駆動するように制御を行う中間転写媒体制御工程と、
前記低速モードのときは、前記1次転写部における1次転写の終了後、直後に通過する前記2次転写部では前記1次転写トナー像の2次転写を行わず、前記1次転写トナー像が前記1次転写部を再通過した後、次に通過する前記2次転写部において前記1次転写トナー像の2次転写を行わせる転写制御工程とを備え、
前記中間転写媒体制御工程において、前記低速モードのときには、前記1次転写部における1次転写の終了後、前記1次転写トナー像が前記1次転写部を再通過する際に、その1次転写トナー像の先端が前記1次転写部に到達した時には前記中間転写媒体を前記第2速度で駆動していることを特徴とする画像形成方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、プリンタ、複写機やファクシミリ装置などの電子写真方式の画像形成技術に関するものである。

【0002】

【従来の技術】従来、露光手段により感光体に形成した静電潜像にトナーを現像手段により付着させてトナー像を形成し、このトナー像を転写紙に転写し、その転写紙上のトナー像を定着手段により転写紙を搬送しつつ当該転写紙に定着するようにした電子写真方式の画像形成装置が知られており、特にカラー画像の形成を可能にする装置として、感光体に形成されたトナー像を中間転写媒体に1次転写し、その中間転写媒体上の1次転写トナー像を転写紙に2次転写するようにした画像形成装置が知られている。

【0003】この画像形成装置では、カラー画像を形成する際には、感光体に複数色のトナー像を順次形成し、各色のトナー像の形成ごとに中間転写媒体に1次転写することにより複数色のトナー像が重ね合わされたカラートナー像を中間転写媒体に形成し、そのカラートナー像を転写紙に2次転写することでカラー画像を得るようにしている。なお、このように構成された画像形成装置では、複数色のうち特定色、多くの場合、黒色トナーを用いて単色印刷を行うことが可能となっている。

【0004】一方、従来、転写紙として、普通紙に加えて、上質紙、葉書、封筒、光沢紙、高精細紙などの普通紙より厚い厚紙を用いることが可能な画像形成装置が実用化されている。ところが、上記のような厚紙を普通紙と同一速度で搬送して定着手段を動作させると、十分な定着性能が得られず、画質の低下を招いてしまう。このような事態は、例えば定着手段の熱容量を増大することなどにより定着性能を向上させると防げるが、その結果、装置の大型化を招いたり、逆に普通紙の定着時に過剰な熱により画質の低下を招くことになるので、このような画像形成装置では、転写紙として厚紙を用いる場合には、普通紙に比べて用紙搬送速度を低下させて定着時間が長くなるようにすることで十分な定着性能を確保している。

【0005】この場合、2次転写時には中間転写媒体の駆動速度を用紙搬送速度に合わせて低速度にする必要があるが、感光体への画像形成や中間転写媒体への1次転写などのプロセス速度も低速度にした装置と、プロセス速度は通常速度のままで2次転写時にのみ駆動速度を低速度にするようにした装置とが考えられる。前者の装置では、画像形成プロセスを2種類の速度で行うことになるので、現像条件や転写条件などについて良好なプロセス設定値を求めるのが1種類の場合に比べて2倍の手間が掛かり、装置設計や動作確認に時間を要するという問題があるが、後者の装置では、画像形成プロセスの速度は1種類であるので、上記のような問題は生じない。

【0006】

【発明が解決しようとする課題】しかし、後者の装置を採用する場合には、通常速度から低速度への減速開始タイミングを十分に検討する必要がある。一般に1次転写部と2次転写部との間の距離は、装置の小型化のために大判の転写紙より短い構成が採用される。そのため、このような構成の装置の場合には、1次転写終了時には既にその1次転写トナー像の先端が2次転写部を通過してしまっている。従って、1次転写終了後、直ぐに2次転写を行わずにそのまま中間転写媒体を回転させ、次に2次転写部を通過する際に2次転写を行うことになる。従って、次に1次転写トナー像の先端が2次転写部に到達する前に、通常速度から低速度に減速しておけばよい。

【0007】ところが、1次転写トナー像が1次転写部を再通過している最中に中間転写媒体の減速を開始すると、中間転写媒体から感光体への逆転写の程度に差が生じ、1次転写トナー像にむらができて画質が低下する虞がある。一方、上記減速開始タイミングが早過ぎて低速度での中間転写媒体の駆動時間が長くなると、画像形成のスループットが低下してしまう。

【0008】本発明は、上記課題に鑑みてなされたもので、転写紙搬送速度として低速のモードを備える場合において、画質の低下を防止し得る画像形成装置および方法を提供することを目的とする。

【0009】また、本発明は、転写紙搬送速度として低速モードを備える場合において、画像形成のスループットの低下を抑制し得る画像形成装置および方法を提供することを目的とする。

【0010】

【課題を解決するための手段】上記目的を達成するために、請求項1に記載の発明は、感光体に形成された静電潜像にトナーを付着させてトナー像を形成する現像手段と、回転して1次転写部および2次転写部を循環的に通過する中間転写媒体と、前記1次転写部において前記中間転写媒体に前記トナー像を1次転写する1次転写手段と、前記2次転写部において前記中間転写媒体上の1次転写トナー像を転写紙に2次転写する2次転写手段と、前記転写紙を搬送しつつ前記転写紙上の2次転写トナー像を当該転写紙に定着する定着手段とを備えた画像形成装置において、転写紙を第1速度で搬送する通常モードと、転写紙を少なくとも前記2次転写部から定着終了まで前記第1速度より低い第2速度で搬送する低速モードとを有する搬送制御手段と、前記通常モードのときは前記中間転写媒体を前記第1速度で駆動し、前記低速モードのときは前記中間転写媒体を少なくとも前記現像手段によるトナー像形成終了までは前記第1速度で駆動するとともに、トナー像形成終了後に前記中間転写媒体の駆動速度を低下させ、少なくとも2次転写終了まで前記中間転写媒体を前記第2速度で駆動するように制御を行う中間転写媒体制御手段と、前記低速モードのときは、前記1次転写部における1次転写の終了後、直後に通過する前記2次転写部では前記1次転写トナー像の2次転写を行わず、前記1次転写トナー像が前記1次転写部を再通過した後、次に通過する前記2次転写部において前記1次転写トナー像の2次転写を行わせる転写制御手段とを備え、前記中間転写媒体制御手段は、前記低速モードのときには、前記1次転写部における1次転写の終了後、前記1次転写トナー像が前記1次転写部を再通過する際に、その1次転写トナー像の先端が前記1次転写部に到達した時には前記中間転写媒体を前記第2速度で駆動していることを特徴としている。

【0011】この構成によれば、転写紙を第1速度で搬送する通常モードと、転写紙を少なくとも2次転写部から定着終了まで第1速度より低い第2速度で搬送する低速モードとを有し、通常モードのときは中間転写媒体が第1速度で駆動され、低速モードのときは中間転写媒体が少なくとも現像手段によるトナー像形成終了までは第1速度で駆動されるとともに、トナー像形成終了後に中間転写媒体の駆動速度が第1速度から第2速度に低下し、少なくとも2次転写終了まで第2速度に維持される。また、低速モードのときは、1次転写部における1次転写の終了後、直後に通過する2次転写部では1次転写トナー像の2次転写が行われず、1次転写トナー像が1次転写部を再通過した後、次に通過する2次転写部に

において1次転写トナー像の2次転写が行われる。

【0012】そして、中間転写媒体制御手段により、低速モードのときには、1次転写部における1次転写の終了後、1次転写トナー像が1次転写部を再通過する際に、その1次転写トナー像の先端が1次転写部に到達した時には中間転写媒体が第2速度で駆動されている。

【0013】従って、1次転写トナー像が第1転写部を再通過中に中間転写媒体の駆動速度が変化しないので、1次転写部における中間転写媒体と感光体との間の環境条件が1次転写トナー像の途中で変化しないことから、1次転写部における中間転写媒体から感光体への逆転写のレベルが変化することに起因して1次転写トナー像にむらが生じ、画質が低下するような事態が未然に防止されることとなる。

【0014】また、前記中間転写媒体制御手段は、前記1次転写トナー像の先端が前記第1転写部に到達した時点で、前記中間転写媒体が前記第2速度で安定して駆動されるように、前記第1速度から第2速度への減速開始時点を制御するものであるとしてもよい（請求項2）。

【0015】この構成によれば、1次転写トナー像の先端が第1転写部に到達した時点で中間転写媒体が安定して第2速度で駆動されるので、中間転写媒体の駆動速度が可能な限り第1速度に維持されることから、画像形成のスループットの低下が極力抑制されることとなる。

【0016】また、前記中間転写媒体制御手段は、前記1次転写トナー像の先端が、前記第1速度から第2速度への減速開始時点から前記第2速度で安定する時点までに前記中間転写媒体の進む距離だけ前記第1転写部から回転駆動方向の上流側の位置に到達した時点で、前記第1速度からの減速を開始させるものであるとしてもよい（請求項3）。

【0017】この構成によれば、1次転写トナー像の先端が、第1速度から第2速度への減速開始時点から第2速度で安定する時点までに中間転写媒体の進む距離だけ第1転写部から回転駆動方向の上流側の位置に到達した時点で、第1速度からの減速が開始されることにより、中間転写媒体が安定して第2速度で駆動される時点に同期して確実に、中間転写媒体上の1次転写トナー像の先端が1次転写部に到達することとなる。また、中間転写媒体の駆動速度が可能な限り第1速度に維持されることから、画像形成のスループットの低下が極力抑制されることとなる。

【0018】また、請求項4記載の発明は、感光体に形成された静電潜像にトナーを現像手段により付着させて形成されるトナー像を、回転する中間転写媒体に1次転写部において1次転写し、その中間転写媒体上の1次転写トナー像を2次転写部において転写紙に2次転写し、その転写紙を搬送しつつ転写紙上の2次転写トナー像を当該転写紙に定着するようにした画像形成方法において、転写紙を第1速度で搬送する通常モードと、転写紙

を少なくとも前記2次転写部から定着終了まで前記第1速度より低い第2速度で搬送する低速モードとを有し、前記通常モードのときは前記中間転写媒体を前記第1速度で駆動し、前記低速モードのときは前記中間転写媒体を少なくとも前記現像手段によるトナー像形成終了までは前記第1速度で駆動するとともに、トナー像形成終了後に前記中間転写媒体の駆動速度を低下させ、少なくとも2次転写終了まで前記中間転写媒体を前記第2速度で駆動するように制御を行う中間転写媒体制御工程と、前記低速モードのときは、前記1次転写部における1次転写の終了後、直後に通過する前記2次転写部では前記1次転写トナー像の2次転写を行わず、前記1次転写トナー像が前記1次転写部を再通過した後、次に通過する前記2次転写部において前記1次転写トナー像の2次転写を行わせる転写制御工程とを備え、前記中間転写媒体制御工程において、前記低速モードのときには、前記1次転写部における1次転写の終了後、前記1次転写トナー像が前記1次転写部を再通過する際に、その1次転写トナー像の先端が前記1次転写部に到達した時には前記中間転写媒体を前記第2速度で駆動していることを特徴としている。

【0019】この構成によれば、転写紙を第1速度で搬送する通常モードと、転写紙を少なくとも2次転写部から定着終了まで第1速度より低い第2速度で搬送する低速モードとを有し、通常モードのときは中間転写媒体が第1速度で駆動され、低速モードのときは中間転写媒体が少なくとも現像手段によるトナー像形成終了までは第1速度で駆動されるとともに、トナー像形成終了後に中間転写媒体の駆動速度が第1速度から第2速度に低下し、少なくとも2次転写終了まで第2速度に維持される。また、低速モードのときは、1次転写部における1次転写の終了後、直後に通過する2次転写部では1次転写トナー像の2次転写が行われず、1次転写トナー像が1次転写部を再通過した後、次に通過する2次転写部において1次転写トナー像の2次転写が行われる。

【0020】そして、中間転写媒体制御手段により、低速モードのときには、1次転写部における1次転写の終了後、1次転写トナー像が1次転写部を再通過する際に、その1次転写トナー像の先端が1次転写部に到達した時には中間転写媒体が第2速度で駆動されている。

【0021】従って、1次転写トナー像が第1転写部を再通過中に中間転写媒体の駆動速度が変化しないので、1次転写部における中間転写媒体と感光体との間の環境条件が1次転写トナー像の途中で変化しないことから、1次転写部における中間転写媒体から感光体への逆転写のレベルが変化することに起因して1次転写トナー像にむらが生じ、画質が低下するような事態が未然に防止されることとなる。

【0022】

【発明の実施の形態】まず、図1、図2を参照して、本

発明に係る画像形成装置の一実施形態であるプリンタの構成について説明する。図1は同プリンタの内部構成を示す図、図2は同プリンタの電氣的構成を示すブロック図である。

【0023】このプリンタは、イエロー（Y）、マゼンタ（M）、シアン（C）、ブラック（K）の4色のトナーを重ね合わせてフルカラー画像を形成したり、例えばブラック（K）のトナーのみを用いて単色画像を形成するものである。このプリンタは、ホストコンピュータなどの外部装置から画像信号を含む印字指令信号が主制御部100に与えられると、この主制御部100からの制御信号に応じてエンジン制御部110がエンジン部1の各部を制御して、装置本体2の下方に配設された給紙カセット3から搬送した転写紙4に、上記画像信号に対応する画像を印字出力する。

【0024】転写紙4として、普通紙に加えて、上質紙、葉書、封筒、光沢紙、高精細紙（例えば白色PETシート）などの普通紙より厚い厚紙や、OHP用透明シートを用いることができる。そして、本プリンタでは、普通紙やOHP用透明シートの場合には通常の第1速度で搬送し、後述するように、厚紙の場合には第1速度より低い第2速度で搬送するようにしている。

【0025】上記エンジン部1は、感光体ユニット10、ロータリー現像部20、中間転写ユニット30、定着ユニット40、露光ユニット50を備えている。この感光体ユニット10は、感光体11、帯電部12およびクリーニング部13を備え、ロータリー現像部20は、イエロートナーが収容されたイエロー現像ユニット2Y、マゼンタトナーが収容されたマゼンタ現像ユニット2M、シアントナーが収容されたシアン現像ユニット2C、ブラクトナーが収容されたブラック現像ユニット2Kなどを備え、中間転写ユニット30は、中間転写ベルト31、垂直同期センサ32、ベルトクリーナ33、ゲートローラ対34、2次転写ローラ35、感光体駆動用モータ36などを備えている。上記7つのユニット10、2Y、2M、2C、2K、30、40は、それぞれ装置本体2に対して着脱自在に構成されている。

【0026】感光体ユニット10の感光体11は、上記7つのユニット10、2Y、2M、2C、2K、30、40が装置本体2に装着された状態で、感光体駆動用モータ36によって矢印5の方向に回転する。この感光体11の周りには、その回転方向5に沿って、帯電部12、ロータリー現像部20およびクリーニング部13がそれぞれ配置されている。

【0027】帯電部12は、所定レベルの高電圧が印加されたワイヤ電極を備え、例えばコロナ放電により、感光体11の外周面を均一に帯電するものである。クリーニング部13は、感光体11の回転方向5における帯電部12の上流側に配置され、感光体11から中間転写ベルト31へのトナー像の1次転写後に感光体11の外周

面に残留しているトナーを掻き落として、感光体11の表面を清掃するものである。

【0028】露光ユニット50は、例えば半導体レーザーからなるレーザ光源51、このレーザ光源51からのレーザ光を反射するポリゴンミラー52、このポリゴンミラー52を高速に回転駆動するスキャナモータ53、ポリゴンミラー52で反射されたレーザ光を集束するレンズ部54、複数の反射ミラー55、水平同期センサ56などを備えている。ポリゴンミラー52によって反射され、レンズ部54および反射ミラー55を介して射出されたレーザ光57は、感光体11の表面において主走査方向（図1の紙面に対して垂直な方向）に走査して、画像信号に対応する静電潜像を感光体11の表面に形成する。このとき、水平同期センサ56により、主走査方向における同期信号、すなわち水平同期信号が得られる。この露光ユニット50は、露光手段として機能する。

【0029】ロータリー現像部20は、各色のトナーを上記静電潜像に付着させて現像するものである。ロータリー現像部20のイエロー現像ユニット2Y、マゼンタ現像ユニット2M、シアン現像ユニット2C、ブラック現像ユニット2Kは軸中心に回転自在に設けられており、これらの現像ユニット2Y、2M、2C、2Kは予め決められた複数の位置に移動可能に配置され、感光体11に対して当接位置および離間位置で選択的に配置される。そして、直流成分もしくは直流成分に交流成分を重ねた現像バイアスが印加されて、感光体11に対して当接位置にある現像ユニットから当該色のトナーが感光体11の表面に付着される。このロータリー現像部20は現像手段に対応する。

【0030】中間転写ユニット30の中間転写ベルト31は、1次転写ローラ31Aを含む複数のローラに掛け渡されており、感光体駆動用モータ36によって感光体11とともに回転駆動される。1次転写ローラ31Aには所定の1次転写バイアスが印加され、この1次転写バイアスによって感光体11上のトナー像が中間転写ベルト31に1次転写される。感光体11は、中間転写ベルト31の回転駆動方向71（図5参照）において1次転写ローラ31Aの直ぐ下流で中間転写ベルト31に当接しており、当該当接位置が1次転写部14に設定されている。

【0031】この中間転写ベルト31は、ほぼ矩形のシート体が継ぎ目で継ぎ合わされて形成された無端ベルトからなる。中間転写ベルト31には、図5に示すように、回転駆動方向71に直交する回転軸方向72の一端側（図5中、上側）に突起部73が設けられている。

【0032】垂直同期センサ32は、例えば互いに対向配置された発光部および受光部を有するフォトインタラプタからなり、回転する中間転写ベルト31の回転軸方向72の一端側に配置され、突起部73の通過を検出す

るもので、この検出信号がエンジン制御部110による画像形成制御の基準となる垂直同期信号として使用される。ベルトクリーナ33は、クリーナ用離接クラッチ37により中間転写ベルト31への当接状態(図1中、実線)および離間状態(図1中、破線)が切換可能に配設されたもので、当接状態で中間転写ベルト31上の残留トナーを掻き落とす。ゲートローラ対34は、ゲートクラッチのオンにより搬送系駆動用モータ60の駆動力が伝達されて回転駆動される。

【0033】2次転写ローラ35は、2次転写ローラ用離接クラッチ38により中間転写ベルト31への当接状態(図1中、実線)および離間状態(図1中、破線)が切り換えられる。この2次転写ローラ35は、中間転写ベルト31に当接した状態で所定の2次転写バイアスが印加されて、転写紙4を搬送しつつ中間転写ベルト31上のトナー像を転写紙4に2次転写させるもので、当該当接位置が2次転写部39に設定されている。

【0034】中間転写ベルト31は中間転写媒体に対応し、1次転写ローラ31Aおよび転写バイアス生成回路118(後述)は1次転写手段に対応し、2次転写ローラ35および転写バイアス生成回路118は2次転写手段に対応する。

【0035】定着ユニット40は、加熱ローラ41および加圧ローラ42を備え、熱ローラ定着方式により転写紙4を搬送しつつ転写紙4上のトナー像を当該転写紙4に定着するものである。定着ユニット40は、定着手段に対応する。

【0036】給紙カセット3の先端(図1中、右端)から上方に向かって、半月状のピックアップローラ61、フィードローラ対62が配設され、ゲートローラ対34、2次転写ローラ35および定着ユニット40を挟んで、さらに搬送ローラ対63、排出ローラ対64が配設されて、これらにより転写紙4の搬送路(図1中、一点鎖線)が形成されている。

【0037】ピックアップローラ61はピックアップソレノイドにより駆動される。フィードローラ対62、ゲートローラ対34、2次転写ローラ35、定着ユニット40の加熱ローラ41、搬送ローラ対63、排出ローラ対64は、それぞれ駆動力伝達機構を介して同一の搬送系駆動用モータ60に連結されている。そして、フィードローラ対62は、フィードクラッチのオンにより、搬送系駆動用モータ60の駆動力が伝達されて回転駆動される。搬送系駆動用モータ60の回転速度は、転写紙4の搬送速度として、普通紙を搬送する通常の第1速度S1と、厚紙を搬送する第2速度S2(<S1)との2種類に切換可能になっている。

【0038】フィードローラ対62、ゲートローラ対34、搬送ローラ対63、排出ローラ対64は、転写紙4の搬送手段を構成する。

【0039】図2において、主制御部100は、CPU 50

101と、ホストコンピュータなどの外部装置との間で制御信号の授受を行うインターフェース102と、このインターフェース102を介して与えられた画像信号を記憶するための画像メモリ103とを備えている。CPU101は、外部装置から画像信号を含む印字指令信号をインターフェース102を介して受信すると、エンジン部1の動作指示に適した形式のジョブデータに変換し、エンジン制御部110に送出する。

【0040】エンジン制御部110は、CPU111、ROM112、RAM113などを備えている。ROM112は、CPU111の制御プログラムなどを記憶するもので、RAM113は、エンジン部1の制御データやCPU111による演算結果などを一時的に記憶するものである。

【0041】CPU111は、エンジン部1からの入力信号として、垂直同期センサ32から垂直同期信号Vsyncを受け取り、水平同期センサ56から水平同期信号Hsyncなどを受け取る。そして、CPU111は、これらの入力信号および制御プログラムに基づき、エンジン部1の各部の動作を制御する。

【0042】すなわちCPU111は、感光体駆動用モータ36を駆動するモータ駆動回路114に制御信号を送出して感光体11および中間転写ベルト31を同期して回転駆動する。なお、本実施形態では感光体駆動用モータ36として例えばステッピングモータが用いられており、入力される制御パルス信号により感光体駆動用モータ36の回転駆動速度が制御される。

【0043】また、CPU111は、搬送系駆動用モータ60を駆動するモータ駆動回路115に制御信号を送出し、給紙カセット3からの転写紙4の搬送を制御する。このとき、転写紙4が普通紙またはOHP用透明シートのときは、転写紙4を予め設定された第1速度S1で搬送するとともに、感光体11および中間転写ベルト31の周速が第1速度S1に一致するように制御する。

【0044】一方、転写紙4が上記厚紙のときは、厚紙(転写紙)4を予め設定された第2速度S2(<S1)で搬送する。これによって、定着ユニット40における転写紙4の通過時間を増大することにより、転写紙4が厚紙のときに生じる定着容量の不足を補うようにしている。ここで、CPU111は、感光体11および中間転写ベルト31については、感光体11の現像を行っているときは、その周速が第1速度S1に一致するように制御し、その現像終了後、予め設定された時点で減速を開始し、その周速が第2速度S2で転写紙4への2次転写が行われるようにしている。この減速開始時点については後述する。

【0045】また、CPU111は、クリーナ用離接クラッチ37を駆動する離接クラッチ駆動回路116に制御信号を送出し、中間転写ベルト31に対するベルトクリーナ33の離間および当接を制御する。また、CPU

111は、2次転写ローラ用離接クラッチ38を駆動する離接クラッチ駆動回路117に制御信号を送出し、中間転写ベルト31に対する2次転写ローラ35の離間および当接を制御する。

【0046】また、CPU111は、転写バイアスを生成する転写バイアス生成回路118に制御信号を送出し、1次転写ローラ31Aに対する1次転写バイアス（例えば数百V）の印加および2次転写ローラ35に対する2次転写バイアス（例えば数kV）の印加を制御する。

【0047】また、CPU111は、例えば装置本体2の表面に配設された操作表示パネル8の操作キーに対する操作内容を受け取るとともに、表示部の表示内容を制御する。このCPU111は、搬送制御手段、中間転写媒体制御手段に対応する。

【0048】次に、図3～図5を参照しつつ、転写紙4が上記厚紙である場合の動作について説明する。図3、図4はエンジン部1の各部の動作を説明するタイミングチャート、図5は中間転写ベルト31の減速開始時点を説明する図である。

【0049】ホストコンピュータなどの外部装置から画像信号を含む印字指令信号が主制御部100に与えられると、この主制御部100からの制御信号に応じてエンジン制御部110がエンジン部1の各部の動作を開始する。このとき、給紙カセット3に積載されている転写紙4のサイズが印字指令信号で指示されているサイズに一致していないときは、操作表示パネル8に給紙カセットの交換を促すメッセージを表示する。なお、図1では1つの給紙カセット3を備えたプリンタとしているが、これに限られず、複数の給紙カセットを備えたものでもよい。

【0050】給紙カセット3に積載されている転写紙4のサイズが印字指令信号で指示されているサイズに一致しているときは、帯電部12により均一に帯電された感光体11の表面に、露光ユニット50からのレーザ光57により上記画像信号に応じた静電潜像が形成され、この静電潜像がロータリー現像部20により現像されてトナー像が形成され、このトナー像は1次転写部14において中間転写ベルト31上に1次転写される。

【0051】すなわち、図3において、感光体駆動用モータ36が第1速度S1で駆動されて中間転写ベルト31が回転し、時刻 t_1 、 t_2 、 t_3 、 t_4 にそれぞれ垂直同期信号Vsyncが出力される。各垂直同期信号Vsyncの立下り時点から所定時間T1後に画像要求信号Vreqが出力され、この画像要求信号Vreqの立下りに同期して、画像信号に対応する静電潜像の形成が開始されるとともに、現像バイアスがオンにされる。

【0052】そして、時刻 t_1 、 t_2 、 t_3 、 t_4 ごとにロータリー現像部20の現像ユニットが切り換えられて、各色のトナー像が感光体11に形成され、順次、中

間転写ベルト31に1次転写される。この間は2次転写ローラ35が中間転写ベルト31に対して離間状態にあるので、各色のトナー像は中間転写ベルト31上に重ね合わされていく。現像バイアスは、時刻 t_1 、 t_2 、 t_3 、 t_4 の各垂直同期信号Vsyncの立下り時点から、転写紙サイズによって予め決められている所定時間T2後にオフにされる。

【0053】これによって、トナー像Y、C、M、Kが重ね合わされたカラー画像が、中間転写ベルト31上の所定領域に1次転写される。

【0054】続いて図4において、最後の静電潜像の現像（トナー像Kの形成）が終了すると、時刻 t_5 （垂直同期信号Vsyncの立下り時点）から所定時間T3後の時刻 t_6 に、感光体駆動用モータ36の減速が開始される。この所定時間T3の決定手順について説明する。なお、図5では感光体駆動用モータ36による中間転写ベルト31の駆動速度の時間推移と、中間転写ベルト31上の1次転写トナー像74の位置および1次転写部14の位置とを対応させて示している。

【0055】ステッピングモータからなる感光体駆動用モータ36は、図5に示すように、減速開始時点 t_6 で減速を開始したときに、第1速度S1から第2速度S2まで低下するのに要する時間T4と、第2速度S2で安定するのに要する時間T5とがそれぞれほぼ一定値になっており、この間に進む距離L1もほぼ一定値になっている。これらの値はモータが決まると既知の値として決まる。

【0056】そこで、中間転写ベルト31上の1次転写トナー像74の先端（回転駆動方向71の下流端）75が、1次転写部14から距離L1だけ回転駆動方向71の上流側の位置に到達するのに要する時刻 t_5 からの経過時間T0を予め求めておき、この経過時間T0から既知の時間（T4+T5）を減算した値を所定時間T3としてROM112に記憶しておく。

【0057】これによって、中間転写ベルト31が安定して第2速度S2の周速で駆動される時点 t_7 に同期して確実に、中間転写ベルト31上の1次転写トナー像74の先端75が1次転写部14に到達することとなる。

【0058】なお、この動作において、減速開始時点 t_6 には、1次転写トナー像74の後端（回転駆動方向71の上流端）76が既に1次転写部14を通過し終わり、第1速度S1での1次転写が完了していることが条件となる。従って、中間転写ベルト31の全長Lは、 $L > (L1 + L2 + L3)$

に設定されていることが必要である。ここで、図5に示すように、L2は1次転写トナー像74の回転駆動方向の寸法、L3は1次転写部14の回転駆動方向の寸法である。

【0059】一方、給紙カセット3に積載されている転写紙束の最上段の転写紙4がピックアップローラ61に

より取り出され、フィードローラ対62により第2速度S2で搬送され、ゲートローラ対34にニップされる。そして、中間転写ベルト31上の1次転写トナー像74にタイミングを合わせてゲートクラッチがオンにされ、ゲートローラ対34から2次転写部39に向けて転写紙4が第2速度S2で搬送される。

【0060】そして、図4において、時刻t5から所定時間後の時刻t8に2次転写ローラ用離接クラッチ38がオンにされて、2次転写ローラ35が中間転写ベルト31に当接する。次いで、時刻t5から所定時間後の時刻t9に転写バイアス生成回路118から2次転写ローラ35への2次転写バイアスの印加がオンにされる。

【0061】これによって、中間転写ベルト31上のトナー像Y、C、M、Kが重ね合わされたカラーの1次転写トナー像が、転写紙4に2次転写される。

【0062】ゲートクラッチは転写紙4の搬出後オフにされ、2次転写バイアスの印加時間T6は、転写紙4のサイズに応じて予め設定されている。設定された2次転写バイアスの印加時間T6が経過した時点で、2次転写バイアスの印加がオフにされるとともに、2次転写ローラ用離接クラッチ38がオンにされて、2次転写ローラ35が中間転写ベルト31から離間する。

【0063】そして、定着ユニット40において、転写紙4が搬送されつつ2次転写トナー像が当該転写紙4に定着される。このとき、転写紙4は、第1速度S1より低い第2速度S2で搬送されているので、十分な定着時間が確保されることとなる。転写紙4は、さらに搬送ローラ対63により搬送され、排出ローラ対64によって装置本体2の上部に設けられた排紙部7に排出される。

【0064】一方、時刻t5から所定時間後の時刻t10に、クリーナ用離接クラッチ37がオンにされて、中間転写ベルト31上の残留トナーの清掃が開始される。そして、次の垂直同期信号Vsyncの立下り時点である時刻t11から所定時間後の時刻t12に、再度クリーナ用離接クラッチ37がオンにされ、ベルトクリーナ33が中間転写ベルト31から離間する。

【0065】そして、時刻t11までに次の印字指令信号が外部装置から主制御部100を介して入力されると、時刻t11から所定時間後の時刻t13に感光体駆動用モータ36が加速されて第2速度S2から第1速度S1に復帰し、次の垂直同期信号Vsyncの立下り時点である時刻t14を基準として、次の画像形成制御が行われる。

【0066】このように、本実施形態によれば、転写紙4が厚紙のときは第1速度S1より低い第2速度S2で搬送するようにしているので、定着ユニット40において十分な定着時間を確保することができ、これによって、厚紙である転写紙4に対するトナー像の定着を良好に行うことができる。

【0067】また、本実施形態によれば、中間転写ベル

ト31上の1次転写トナー像74が1次転写部14を再通過する際には、通過中に駆動速度が変化することなく一定速度(第2速度S2)で再通過させるようにしているので、1次転写部14における中間転写ベルト31と感光体11との間の環境条件が1次転写トナー像74の途中で変化しない。従って、中間転写ベルト31から感光体11への逆転写のレベルが変化することに起因して1次転写トナー像74にむらが生じ、画質が低下するような事態を未然に防止することができる。

【0068】また、本実施形態によれば、中間転写ベルト31が安定して第2速度S2の周速で駆動される時点t7に、中間転写ベルト31上の1次転写トナー像74の先端75が1次転写部14に到達するように、中間転写ベルト31の減速開始時点t6を設定しているので、中間転写ベルト31の駆動速度を可能な限り第1速度S1に維持していることから、画像形成のスループットの低下を極力抑制することができる。

【0069】また、本実施形態によれば、感光体駆動用モータ36としてステッピングモータを用いているので、第1速度S1から第2速度S2まで低下するのに要する時間T4、第2速度S2で安定するのに要する時間T5、この間に進む距離L1をほぼ一定値とすることができ、これによって所定時間T3を精度良く求めることができる。

【0070】なお、本発明は上記実施形態に限定されるものではなく、その趣旨を逸脱しない限りにおいて上述したものに対して種々の変更を加えることが可能である。

【0071】例えば、上記実施形態では、継ぎ目で継ぎ合わされた無端ベルトからなる中間転写ベルト31を用いているが、本発明の中間転写媒体はこれに限られず、例えば継ぎ目の無いシームレスの無端ベルトからなる中間転写ベルトや、円筒状の中間転写ドラムを用いてもよい。

【0072】また、上記実施形態では、中間転写ベルト31が安定して第2速度S2の周速で駆動される時点t7に、中間転写ベルト31上の1次転写トナー像74の先端75が1次転写部14に到達するように中間転写ベルト31の減速開始時点t6を設定しているが、これに限られず、現像終了時点以降であれば、減速開始時点t6より早い時点で減速を開始するようにしてもよい。この場合でも、1次転写トナー像74にむらが生じて画質が低下するような事態を未然に防止することができるという効果を奏し得る。

【0073】また、上記実施形態では、垂直同期信号Vsyncから画像要求信号Vreqを出力するまでの経過時間T1が一定値であり、1次転写トナー像74の先端75の位置は転写紙サイズに関係なく同一になっているので、所定時間T3も転写紙サイズに関係なく一定値になっているが、これに限られない。例えば1次転写トナー

像74の後端(回転駆動方向71の上流端)の位置を転写紙サイズに関係なく同一にすべく、各転写紙サイズについて、垂直同期信号Vsyncから画像要求信号Vreqを出力するまでの経過時間を異なるものとしてもよい。この場合には、各転写紙サイズについて、所定時間T3をそれぞれ求めておき、制御プログラムとしてROM112に記憶しておけばよい。

【0074】また、上記実施形態で説明したように、感光体駆動用モータ36としてステッピングモータを用いるのが好ましいが、本発明はこれに限られるものではなく、DCブラシレスモータなどの他のモータを採用してもよい。

【0075】また、上記実施形態では、ホストコンピュータなどの外部装置より与えられた画像を転写紙に印刷するプリンタを用いて説明しているが、本発明はこれに限られず、複写機やファクシミリ装置などを含む一般の電子写真方式の画像形成装置に適用することができる。

【0076】

【発明の効果】以上説明したように、請求項1、4の発明によれば、低速モードのときには、1次転写部における1次転写の終了後、1次転写トナー像が1次転写部を再通過する際に、その1次転写トナー像の先端が1次転写部に到達した時には中間転写媒体を第2速度で駆動するようにしているので、1次転写トナー像が第1転写部を再通過中に中間転写媒体の駆動速度が変化しないことから、1次転写部における中間転写媒体と感光体との間の環境条件が1次転写トナー像の途中で変化しない。従って、1次転写部における中間転写媒体から感光体への逆転写のレベルが変化することに起因して1次転写トナー像にむらが生じ、画質が低下するような事態を未然に防止することができる。

【0077】また、請求項2の発明によれば、1次転写トナー像の先端が第1転写部に到達した時点で、中間転写媒体が第2速度で安定して駆動されるように、第1速度から第2速度への減速開始時点を制御するようにしているので、中間転写媒体の駆動速度が可能な限り第1速度に維持されることから、画像形成のスループットの低下を極力抑制することができる。

【0078】また、請求項3の発明によれば、1次転写

トナー像の先端が、第1速度から第2速度への減速開始時点から第2速度で安定する時点までに中間転写媒体の進む距離だけ第1転写部から回転駆動方向の上流側の位置に到達した時点で、第1速度からの減速を開始させるようにしているので、中間転写媒体が安定して第2速度で駆動される時点に同期して確実に、中間転写媒体上の1次転写トナー像の先端を1次転写部に到達させることができる。これによって、中間転写媒体の駆動速度が可能な限り第1速度に維持されることから、画像形成のスループットの低下を極力抑制することができる。

【図面の簡単な説明】

【図1】 本発明に係る画像形成装置の一実施形態であるプリンタの内部構成を示す図である。

【図2】 同プリンタの電氣的構成を示すブロック図である。

【図3】 エンジン部の各部の動作を説明するタイミングチャートである。

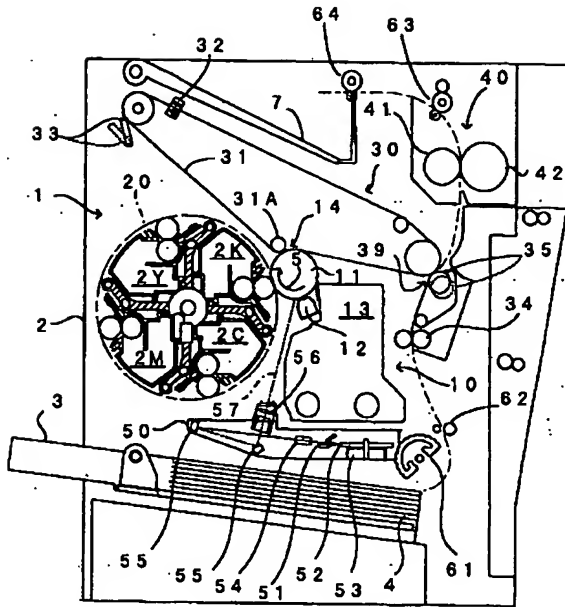
【図4】 エンジン部の各部の動作を説明するタイミングチャートで、図3の続きを示している。

【図5】 中間転写ベルトの減速開始時点を説明する図である。

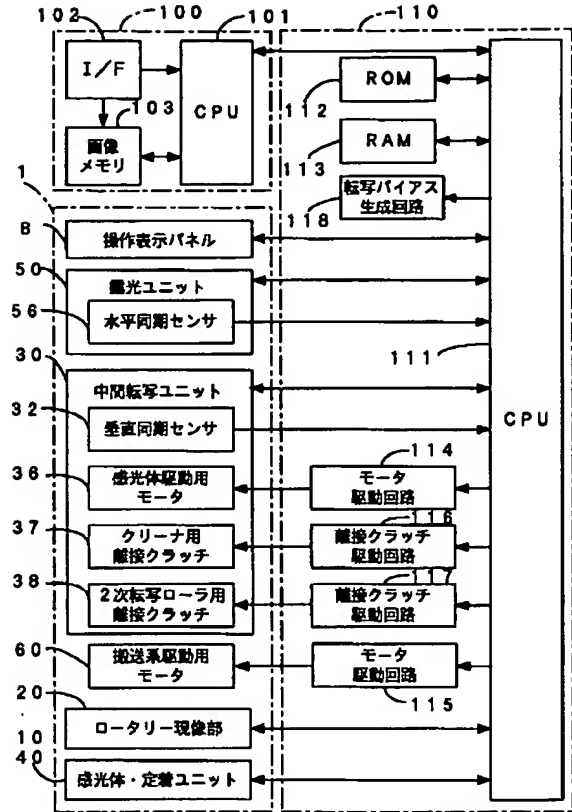
【符号の説明】

- 4 転写紙
- 11 感光体
- 20 ロータリー現像部(現像手段)
- 31 中間転写ベルト(中間転写媒体)
- 31A 1次転写ローラ(1次転写手段)
- 35 2次転写ローラ(2次転写手段)
- 40 定着ユニット(定着手段)
- 71 回転駆動方向
- 74 中間転写ベルト上の1次転写トナー像
- 75 1次転写トナー像の先端
- 110 エンジン制御部
- 111 CPU(搬送制御手段、中間転写媒体制御手段)
- 118 転写バイアス生成回路(1次転写手段、2次転写手段)
- S1 第1速度
- S2 第2速度

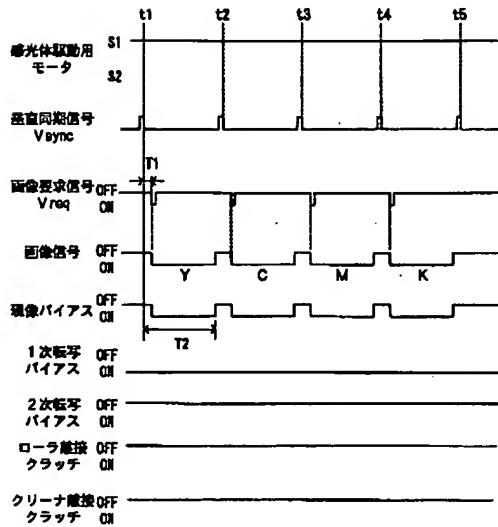
【図1】



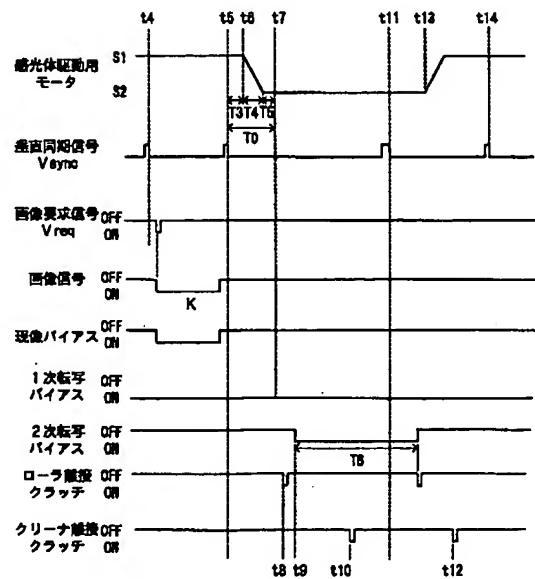
【図2】



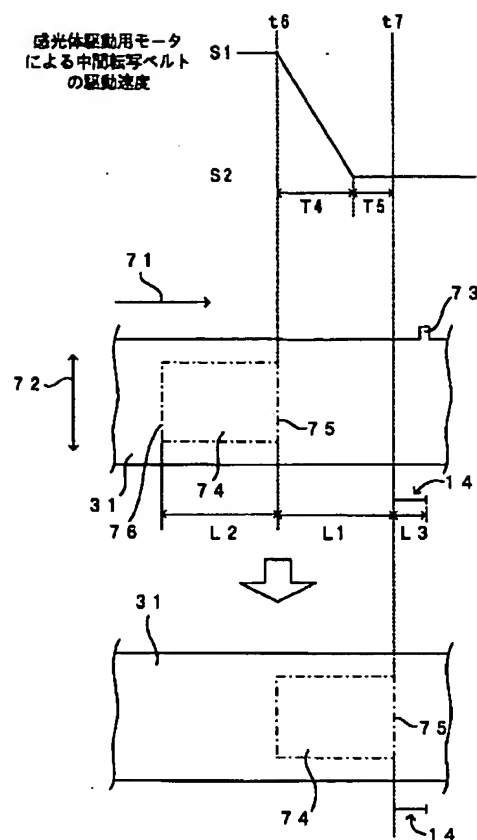
【図3】



【図4】



【図5】



フロントページの続き

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 CB09
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 GB44 HA02 HB12 HB22 JA02
 JA29 JB06 JB49 JC03 JC19
 PA10 PA11 PA26

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the image formation technique of electrophotography methods, such as a printer, a copying machine, and facsimile apparatus.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to invention of claims 1 and 4, at the time of a slow mode Since he is trying to drive a middle transfer medium at the 2nd rate in case a primary imprint toner image re-passes the primary imprint sections after termination of the primary imprint in the primary imprint sections when the tip of the primary imprint toner image reaches the primary imprint sections Since the drive rate of a middle transfer medium does not change [a primary imprint toner image] the 1st imprint section during re-passage, it does not change, as the environmental condition between the middle transfer media and photo conductors in the primary imprint sections is a primary imprint toner image. Therefore, it originates in the level of the reverse transcription from the middle transfer medium in the primary imprint sections to a photo conductor changing, unevenness arises in a primary imprint toner image, and the situation where image quality deteriorates can be prevented beforehand.

[0077] Moreover, since he is trying according to invention of claim 2 to control the moderation initiation time to the 2nd rate from the 1st rate so that a middle transfer medium is stabilized and drives at the 2nd rate when the tip of a primary imprint toner image reaches the 1st imprint section and the drive rate of a middle transfer medium is maintained as much as possible by the 1st rate, the fall of the throughput of image formation can be controlled as much as possible.

[0078] Moreover, when only the distance to which a middle transfer medium will progress by the time of the tip of a primary imprint toner image being stabilized at the 2nd rate from the moderation initiation time to the 2nd rate from the 1st rate arrives at the location of the upstream of a rotation driving direction from the 1st imprint section according to invention of claim 3 Since he is trying to make the moderation from the 1st rate start, the tip of the primary imprint toner image on a middle transfer medium can be made to reach the primary imprint sections certainly synchronizing with the time of a middle transfer medium being stabilized and driving at the 2nd rate. By this, since the drive rate of a middle transfer medium is maintained as much as possible by the 1st rate, the fall of the throughput of image formation can be controlled as much as possible.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image formation technique of electrophotography methods, such as a printer, a copying machine, and facsimile apparatus.

[0002]

[Description of the Prior Art] Conventionally, make a toner adhere to the electrostatic latent image formed in the photo conductor with the exposure means with a development means, and a toner image is formed. Imprint this toner image to a transfer paper, and the image formation equipment of the electrophotography method it was made to be fixed to the transfer paper concerned is known in the toner image on that transfer paper, conveying a transfer paper with a fixing means, and it considers as the equipment which enables especially formation of a color picture. The image formation equipment which imprints the primary toner image formed in the photo conductor to a middle transfer medium, and imprinted the secondary primary imprint toner image on the middle transfer medium to the transfer paper is known.

[0003] In case a color picture is formed, sequential formation of the toner image of two or more colors is carried out at a photo conductor, and he forms in a middle transfer medium the color toner image which the toner image of two or more colors piled up by imprinting the 1st order to a middle transfer medium for every formation of the toner image of each color, and is trying to obtain a color picture with this image formation equipment by imprinting the 2nd order of that color toner image to a transfer paper. In addition, it is possible to perform monochrome printing with the image formation equipment constituted in this way, using a black toner the case of a specific color many among two or more colors.

[0004] On the other hand, in addition to the regular paper, the image formation equipment which can use pasteboard thicker than regular papers, such as paper of fine quality, a postcard, an envelope, glossy paper, and highly minute paper, is conventionally put in practical use as a transfer paper. However, if the above pasteboard is conveyed at the same rate as a regular paper and a fixing means is operated, sufficient fixing engine performance will not be obtained but deterioration of image quality will be caused. Although it can protect if such a situation raises the fixing engine performance by increasing the heat capacity of for example, a fixing means etc. Since enlargement of equipment will be caused or deterioration of image quality will be conversely caused with superfluous heat at the time of fixing of a regular paper, consequently, with such image formation equipment In using pasteboard as a transfer paper, it has secured fixing engine performance sufficient by reducing a form bearer rate compared with a regular paper, and making it fixing time amount become long.

[0005] In this case, although it is necessary to double the drive rate of a middle transfer medium with a form bearer rate at the time of a secondary imprint, and to make it a low speed, the equipment which also made the low speed process rates, such as image formation to a photo conductor and a primary imprint to a middle transfer medium, and a process rate can consider the equipment which was usually made to make a drive rate a low speed with the rate only at the time of a secondary imprint. With the former equipment, since an image formation process will be performed at two kinds of rates, there is a

problem that take twice as many time and effort as this compared with the case where it is one kind to calculate the process set point good about development conditions, imprint conditions, etc., and an equipment design and a check of operation take time amount, but with the latter equipment, since the rate of an image formation process is one kind, the above problems are not produced.

[0006]

[Problem(s) to be Solved by the Invention] However, to adopt the latter equipment, it is usually necessary to fully examine the moderation initiation timing from a rate to a low speed. Generally the configuration for the miniaturization of equipment with a distance shorter than a large-sized transfer paper between the primary imprint sections and the secondary imprint sections is adopted. Therefore, in the case of such equipment of a configuration, at the time of primary imprint termination, the tip of the primary imprint toner image has already passed the secondary imprint sections. Therefore, a middle transfer medium is rotated as it is after primary imprint termination, without performing a secondary imprint immediately, and a secondary imprint will be performed in case the secondary imprint sections are passed next. Therefore, what is necessary is just to usually slow down from the rate to the low speed, before the tip of a primary imprint toner image next reaches the secondary imprint sections.

[0007] However, when a primary imprint toner image starts moderation of a middle transfer medium to the midst which has re-passed the primary imprint sections, a difference arises in extent of the reverse transcription from a middle transfer medium to a photo conductor, and there is a possibility that unevenness may be made to a primary imprint toner image, and image quality may deteriorate. On the other hand, if the above-mentioned moderation initiation timing is too early and the drive time amount of the middle transfer medium in a low speed becomes long, the throughput of image formation will fall.

[0008] This invention was made in view of the above-mentioned technical problem, and when it has the low-speed mode as a transfer paper bearer rate, it aims at offering the image formation equipment and the approach of preventing deterioration of image quality.

[0009] Moreover, this invention aims at offering the image formation equipment and the approach of controlling the fall of the throughput of image formation, when it has a slow mode as a transfer paper bearer rate.

[0010]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention according to claim 1 A development means to make a toner adhere to the electrostatic latent image formed in the photo conductor, and to form a toner image, The middle transfer medium which rotates and passes cyclically the primary imprint sections and the secondary imprint sections, Primary imprint means to imprint the 1st order of said toner image to said middle transfer medium in said primary imprint sections, Secondary imprint means to imprint the secondary primary imprint toner image on said middle transfer medium to a transfer paper in said secondary imprint sections, In image formation equipment equipped with a fixing means by which the secondary imprint toner image on said transfer paper is fixed to the transfer paper concerned, conveying said transfer paper A transfer-control means to have the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate [at least] lower than said 1st rate from said secondary imprint sections to fixing termination, At the time of said normal mode, while driving said middle transfer medium at said 1st rate and driving said middle transfer medium at said 1st rate to the toner image formation termination by said development means at least at the time of said slow mode The middle transfer-medium control means which controls to reduce the drive rate of said middle transfer medium after toner image formation termination, and to drive said middle transfer medium at said 2nd rate till secondary [at least] imprint termination, After termination of a primary imprint [in / in the time of said slow mode / said primary imprint sections], The secondary imprint of said primary imprint toner image is not made to perform in said secondary imprint sections which pass immediately after. After said primary imprint toner image re-passes said primary imprint sections, it has the imprint control means to which the secondary imprint of said primary imprint toner image is made to carry out in said secondary imprint sections which pass next. Said middle transfer-medium control means at the time of said slow mode After termination of the

primary imprint in said primary imprint sections, in case said primary imprint toner image re-passes said primary imprint sections, when the tip of the primary imprint toner image reaches said primary imprint sections, it is characterized by driving said middle transfer medium at said 2nd rate.

[0011] According to this configuration, it has the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate lower than the 1st rate from the secondary [at least] imprint section to fixing termination. While driving toner image formation termination according [a middle transfer medium] to a development means at least at the 1st rate at the time of a slow mode by a middle transfer medium driving at the 1st rate at the time of the normal mode. The drive rate of a middle transfer medium falls to the 2nd rate from the 1st rate after toner image formation termination, and it is maintained by the 2nd rate till secondary [at least] imprint termination. Moreover, at the time of a slow mode, in the secondary imprint sections which pass after termination of the primary imprint in the primary imprint sections, and to immediately after, after the secondary imprint of a primary imprint toner image is not performed but a primary imprint toner image re-passes the primary imprint sections, in the secondary imprint sections which pass next, the secondary imprint of a primary imprint toner image is performed.

[0012] And by the middle transfer-medium control means, at the time of a slow mode, after termination of the primary imprint in the primary imprint sections, in case a primary imprint toner image re-passes the primary imprint sections, when the tip of the primary imprint toner image reaches the primary imprint sections, the middle transfer medium is driving at the 2nd rate.

[0013] Therefore, since the drive rate of a middle transfer medium does not change during re-passage, a primary imprint toner image the 1st imprint section From not changing, as the environmental condition between the middle transfer media and photo conductors in the primary imprint sections is a primary imprint toner image It will originate in the level of the reverse transcription from the middle transfer medium in the primary imprint sections to a photo conductor changing, unevenness will arise in a primary imprint toner image, and the situation where image quality deteriorates will be prevented beforehand.

[0014] Moreover, when the tip of said primary imprint toner image reaches said 1st imprint section, though said middle transfer-medium control means controls the moderation initiation time to the 2nd rate from said 1st rate so that said middle transfer medium is stabilized and drives at said 2nd rate, it is good (claim 2).

[0015] Since according to this configuration a middle transfer medium is stabilized, it drives at the 2nd rate, when the tip of a primary imprint toner image reaches the 1st imprint section and the drive rate of a middle transfer medium is maintained as much as possible by the 1st rate, the fall of the throughput of image formation will be controlled as much as possible.

[0016] Moreover, when only the distance to which said middle transfer medium will progress by the time of the tip of said primary imprint toner image being stabilized at said 2nd rate from the moderation initiation time to the 2nd rate from said 1st rate arrives at the location of the upstream of a rotation driving direction from said 1st imprint section, though said middle transfer-medium control means makes the moderation from said 1st rate start, it is good (claim 3).

[0017] When only the distance to which a middle transfer medium will progress by the time of the tip of a primary imprint toner image being stabilized at the 2nd rate from the moderation initiation time to the 2nd rate from the 1st rate arrives at the location of the upstream of a rotation driving direction from the 1st imprint section according to this configuration By starting the moderation from the 1st rate, the tip of the primary imprint toner image on a middle transfer medium will reach the primary imprint sections certainly synchronizing with the time of a middle transfer medium being stabilized and driving at the 2nd rate. Moreover, since the drive rate of a middle transfer medium is maintained as much as possible by the 1st rate, the fall of the throughput of image formation will be controlled as much as possible.

[0018] Invention according to claim 4 moreover, the toner image which a toner is made to adhere to the electrostatic latent image formed in the photo conductor with a development means, and is formed in it In the primary imprint sections, imprint the 1st order to the middle transfer medium to rotate, and the secondary primary imprint toner image on the middle transfer medium is imprinted to a transfer paper in

the secondary imprint sections. In the image formation approach the secondary imprint toner image on a transfer paper was made to be fixed to the transfer paper concerned, conveying the transfer paper. It has the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate [at least] lower than said 1st rate from said secondary imprint sections to fixing termination. At the time of said normal mode, while driving said middle transfer medium at said 1st rate and driving said middle transfer medium at said 1st rate to the toner image formation termination by said development means at least at the time of said slow mode. The middle transfer-medium control process which controls to reduce the drive rate of said middle transfer medium after toner image formation termination, and to drive said middle transfer medium at said 2nd rate till secondary [at least] imprint termination. After termination of a primary imprint [in / in the time of said slow mode / said primary imprint sections], The secondary imprint of said primary imprint toner image is not made to perform in said secondary imprint sections which pass immediately after. After said primary imprint toner image re-passes said primary imprint sections, have the transcriptional control process to which the secondary imprint of said primary imprint toner image is made to carry out in said secondary imprint sections which pass next, and it sets at said middle transfer-medium control process. After termination of a primary imprint [in / in the time of said slow mode / said primary imprint sections], In case said primary imprint toner image re-passes said primary imprint sections, when the tip of the primary imprint toner image reaches said primary imprint sections, it is characterized by driving said middle transfer medium at said 2nd rate.

[0019] According to this configuration, it has the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate lower than the 1st rate from the secondary [at least] imprint section to fixing termination.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention according to claim 1 A development means to make a toner adhere to the electrostatic latent image formed in the photo conductor, and to form a toner image, The middle transfer medium which rotates and passes cyclically the primary imprint sections and the secondary imprint sections, Primary imprint means to imprint the 1st order of said toner image to said middle transfer medium in said primary imprint sections, Secondary imprint means to imprint the secondary primary imprint toner image on said middle transfer medium to a transfer paper in said secondary imprint sections, In image formation equipment equipped with a fixing means by which the secondary imprint toner image on said transfer paper is fixed to the transfer paper concerned, conveying said transfer paper A transfer-control means to have the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate [at least] lower than said 1st rate from said secondary imprint sections to fixing termination, At the time of said normal mode, while driving said middle transfer medium at said 1st rate and driving said middle transfer medium at said 1st rate to the toner image formation termination by said development means at least at the time of said slow mode The middle transfer-medium control means which controls to reduce the drive rate of said middle transfer medium after toner image formation termination, and to drive said middle transfer medium at said 2nd rate till secondary [at least] imprint termination, After termination of a primary imprint [in / in the time of said slow mode / said primary imprint sections], The secondary imprint of said primary imprint toner image is not made to perform in said secondary imprint sections which pass immediately after. After said primary imprint toner image re-passes said primary imprint sections, it has the imprint control means to which the secondary imprint of said primary imprint toner image is made to carry out in said secondary imprint sections which pass next. Said middle transfer-medium control means at the time of said slow mode After termination of the primary imprint in said primary imprint sections, in case said primary imprint toner image re-passes said primary imprint sections, when the tip of the primary imprint toner image reaches said primary imprint sections, it is characterized by driving said middle transfer medium at said 2nd rate.

[0011] According to this configuration, it has the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate lower than the 1st rate from the secondary [at least] imprint section to fixing termination. While driving toner image formation termination according [a middle transfer medium] to a development means at least at the 1st rate at the time of a slow mode by a middle transfer medium driving at the 1st rate at the time of the normal mode The drive rate of a middle transfer medium falls to the 2nd rate from the 1st rate after toner image formation termination, and it is maintained by the 2nd rate till secondary [at least] imprint termination. Moreover, at the time of a slow mode, in the secondary imprint sections which pass after termination of the primary imprint in the primary imprint sections, and to immediately after, after the secondary imprint of a primary imprint toner image is not performed but a primary imprint toner image re-passes the primary imprint sections, in the secondary imprint sections which pass next, the secondary imprint of a primary imprint toner image is performed.

[0012] And by the middle transfer-medium control means, at the time of a slow mode, after termination

of the primary imprint in the primary imprint sections, in case a primary imprint toner image re-passes the primary imprint sections, when the tip of the primary imprint toner image reaches the primary imprint sections, the middle transfer medium is driving at the 2nd rate.

[0013] Therefore, since the drive rate of a middle transfer medium does not change during re-passage, a primary imprint toner image the 1st imprint section From not changing, as the environmental condition between the middle transfer media and photo conductors in the primary imprint sections is a primary imprint toner image It will originate in the level of the reverse transcription from the middle transfer medium in the primary imprint sections to a photo conductor changing, unevenness will arise in a primary imprint toner image, and the situation where image quality deteriorates will be prevented beforehand.

[0014] Moreover, when the tip of said primary imprint toner image reaches said 1st imprint section, though said middle transfer-medium control means controls the moderation initiation time to the 2nd rate from said 1st rate so that said middle transfer medium is stabilized and drives at said 2nd rate, it is good (claim 2).

[0015] Since according to this configuration a middle transfer medium is stabilized, it drives at the 2nd rate, when the tip of a primary imprint toner image reaches the 1st imprint section and the drive rate of a middle transfer medium is maintained as much as possible by the 1st rate, the fall of the throughput of image formation will be controlled as much as possible.

[0016] Moreover, when only the distance to which said middle transfer medium will progress by the time of the tip of said primary imprint toner image being stabilized at said 2nd rate from the moderation initiation time to the 2nd rate from said 1st rate arrives at the location of the upstream of a rotation driving direction from said 1st imprint section, though said middle transfer-medium control means makes the moderation from said 1st rate start, it is good (claim 3).

[0017] When only the distance to which a middle transfer medium will progress by the time of the tip of a primary imprint toner image being stabilized at the 2nd rate from the moderation initiation time to the 2nd rate from the 1st rate arrives at the location of the upstream of a rotation driving direction from the 1st imprint section according to this configuration By starting the moderation from the 1st rate, the tip of the primary imprint toner image on a middle transfer medium will reach the primary imprint sections certainly synchronizing with the time of a middle transfer medium being stabilized and driving at the 2nd rate. Moreover, since the drive rate of a middle transfer medium is maintained as much as possible by the 1st rate, the fall of the throughput of image formation will be controlled as much as possible.

[0018] Invention according to claim 4 moreover, the toner image which a toner is made to adhere to the electrostatic latent image formed in the photo conductor with a development means, and is formed in it In the primary imprint sections, imprint the 1st order to the middle transfer medium to rotate, and the secondary primary imprint toner image on the middle transfer medium is imprinted to a transfer paper in the secondary imprint sections. In the image formation approach the secondary imprint toner image on a transfer paper was made to be fixed to the transfer paper concerned, conveying the transfer paper It has the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate [at least] lower than said 1st rate from said secondary imprint sections to fixing termination. At the time of said normal mode, while driving said middle transfer medium at said 1st rate and driving said middle transfer medium at said 1st rate to the toner image formation termination by said development means at least at the time of said slow mode The middle transfer-medium control process which controls to reduce the drive rate of said middle transfer medium after toner image formation termination, and to drive said middle transfer medium at said 2nd rate till secondary [at least] imprint termination, After termination of a primary imprint [in / in the time of said slow mode / said primary imprint sections], The secondary imprint of said primary imprint toner image is not made to perform in said secondary imprint sections which pass immediately after. After said primary imprint toner image re-passes said primary imprint sections, have the transcriptional control process to which the secondary imprint of said primary imprint toner image is made to carry out in said secondary imprint sections which pass next, and it sets at said middle transfer-medium control process. After termination of a primary imprint [in / in the time of said slow mode / said primary imprint

sections], In case said primary imprint toner image re-passes said primary imprint sections, when the tip of the primary imprint toner image reaches said primary imprint sections, it is characterized by driving said middle transfer medium at said 2nd rate.

[0019] According to this configuration, it has the normal mode which conveys a transfer paper at the 1st rate, and the slow mode which conveys a transfer paper at the 2nd rate lower than the 1st rate from the secondary [at least] imprint section to fixing termination. While driving toner image formation termination according [a middle transfer medium] to a development means at least at the 1st rate at the time of a slow mode by a middle transfer medium driving at the 1st rate at the time of the normal mode The drive rate of a middle transfer medium falls to the 2nd rate from the 1st rate after toner image formation termination, and it is maintained by the 2nd rate till secondary [at least] imprint termination. Moreover, at the time of a slow mode, in the secondary imprint sections which pass after termination of the primary imprint in the primary imprint sections, and to immediately after, after the secondary imprint of a primary imprint toner image is not performed but a primary imprint toner image re-passes the primary imprint sections, in the secondary imprint sections which pass next, the secondary imprint of a primary imprint toner image is performed.

[0020] And by the middle transfer-medium control means, at the time of a slow mode, after termination of the primary imprint in the primary imprint sections, in case a primary imprint toner image re-passes the primary imprint sections, when the tip of the primary imprint toner image reaches the primary imprint sections, the middle transfer medium is driving at the 2nd rate.

[0021] Therefore, since the drive rate of a middle transfer medium does not change during re-passage, a primary imprint toner image the 1st imprint section From not changing, as the environmental condition between the middle transfer media and photo conductors in the primary imprint sections is a primary imprint toner image It will originate in the level of the reverse transcription from the middle transfer medium in the primary imprint sections to a photo conductor changing, unevenness will arise in a primary imprint toner image, and the situation where image quality deteriorates will be prevented beforehand.

[0022]

[Embodiment of the Invention] First, with reference to drawing 1 and drawing 2 , the configuration of the printer which is 1 operation gestalt of the image formation equipment concerning this invention is explained. Drawing in which drawing 1 shows the internal configuration of this printer, and drawing 2 are the block diagrams showing the electric configuration of this printer.

[0023] This printer piles up the toner of four colors of yellow (Y), a Magenta (M), cyanogen (C), and black (K), and a full color image is formed or it forms a monochrome image only using the toner of black (K). According to the control signal from this main control section 100, the engine control section 110 will control each part of the engine section 1, and this printer will carry out the printout of the image corresponding to the above-mentioned picture signal to the transfer paper 4 conveyed from the sheet paper cassette 3 arranged under the body 2 of equipment, if the printing command signal which includes a picture signal from external devices, such as a host computer, is given to the main control section 100.

[0024] In addition to a regular paper, as a transfer paper 4, pasteboard thicker than regular papers, such as paper of fine quality, a postcard, an envelope, glossy paper, and highly minute paper (for example, white PET sheet), and the transparence sheet for OHP can be used. And he is trying in the case of a regular paper or the transparence sheet for OHP, to convey at the 2nd rate lower than the 1st rate by this printer, in the case of pasteboard so that it may convey 1st at the rate of usual and may mention later.

[0025] The above-mentioned engine section 1 is equipped with the photo conductor unit 10, the rotary development section 20, the middle imprint unit 30, the fixing unit 40, and the exposure unit 50. This photo conductor unit 10 is equipped with a photo conductor 11, a live part 12, and the cleaning section 13. The rotary development section 20 Yellow development unit 2Y in which the yellow toner was held, Magenta development unit 2M in which the Magenta toner was held, It has black development unit 2K in which cyanogen development unit 2C in which the cyanogen toner was held, and a black toner were held. The middle imprint unit 30 It has the middle imprint belt 31, the vertical-synchronization sensor 32, the belt cleaner 33, the 34 or secondary gate roller pair imprint roller 35, the motor 36 for a photo

conductor drive, etc. The seven above-mentioned units 10, 2Y, 2M, 2C, 2K, 30, and 40 are constituted free [attachment and detachment] to the body 2 of equipment, respectively.

[0026] The photo conductor 11 of the photo conductor unit 10 is in the condition that the body 2 of equipment was equipped with the seven above-mentioned units 10, 2Y, 2M, 2C, 2K, 30, and 40, and rotates in the direction of an arrow head 5 by the motor 36 for a photo conductor drive. Around this photo conductor 11, a live part 12, the rotary development section 20, and the cleaning section 13 are arranged along that hand of cut 5, respectively.

[0027] A live part 12 is equipped with the wire electrode with which the high voltage of predetermined level was impressed, for example, is charged in homogeneity in the peripheral face of a photo conductor 11 by corona discharge. The cleaning section 13 is arranged at the upstream of the live part 12 in the hand of cut 5 of a photo conductor 11, fails to scratch the toner which remains to the peripheral face of a photo conductor 11 after the primary imprint of the toner image from the photo conductor 11 to the middle imprint belt 31, and cleans the front face of a photo conductor 11.

[0028] The exposure unit 50 is equipped with the laser light source 51 which consists of semiconductor laser, the polygon mirror 52 which reflects the laser beam from this laser light source 51, the scanner motor 53 which carries out the rotation drive of this polygon mirror 52 at a high speed, the lens section 54 which converges the laser beam reflected by the polygon mirror 52, two or more reflective mirrors 55, the horizontal synchronization sensor 56, etc. The laser beam 57 which was reflected by the polygon mirror 52 and injected through the lens section 54 and the reflective mirror 55 is scanned in the front face of a photo conductor 11 to a main scanning direction (it is a perpendicular direction to the space of drawing 1), and forms the electrostatic latent image corresponding to a picture signal in the front face of a photo conductor 11. At this time, the synchronizing signal in a main scanning direction, i.e., a Horizontal Synchronizing signal, is obtained by the horizontal synchronization sensor 56. This exposure unit 50 functions as an exposure means.

[0029] The rotary development section 20 makes the toner of each color adhere to the above-mentioned electrostatic latent image, and develops it. yellow development unit 2Y of the rotary development section 20, Magenta development unit 2M, cyanogen development unit 2C, and black development unit 2K are prepared in the shaft center free [rotation], and these development units 2Y, 2M, 2C, and 2K are arranged movable in two or more locations decided beforehand -- having -- a photo conductor 11 -- receiving -- a contact location and alienation -- it is arranged alternatively in a location. And the development bias which superimposed the alternating current component on the dc component or the dc component is impressed, and the front face of a photo conductor 11 adheres to the toner of the color concerned from the development unit which is in a contact location to a photo conductor 11. This rotary development section 20 corresponds to a development means.

[0030] Two or more rollers containing primary imprint roller 31A are built over the middle imprint belt 31 of the middle imprint unit 30, and a rotation drive is carried out with a photo conductor 11 by the motor 36 for a photo conductor drive. Predetermined primary imprint bias is impressed to primary imprint roller 31A, and the primary toner image on a photo conductor 11 is imprinted by the middle imprint belt 31 by this primary imprint bias. a photo conductor 11 -- the rotation driving direction 71 (refer to drawing 5) of the middle imprint belt 31 -- setting -- primary imprint roller 31A -- it is immediately in contact with the middle imprint belt 31 on the lower stream of a river, and the contact location concerned is set as the primary imprint sections 14.

[0031] This middle imprint belt 31 consists of an endless belt with which the rectangular sheet object was joined together and formed at the joint mostly. As shown in the middle imprint belt 31 at drawing 5 , the height 73 is formed in the end side (the inside of drawing 5 , on) of the direction 72 of a revolving shaft which intersects perpendicularly with the rotation driving direction 71.

[0032] The vertical-synchronization sensor 32 is arranged at the end side of the direction 72 of a revolving shaft of the middle imprint belt 31 which consists of a photo interrupter which has the light-emitting part and light sensing portion by which opposite arrangement was carried out, and rotates, detects passage of a height 73, and is used as a Vertical Synchronizing signal with which this detecting signal serves as criteria of the image formation control by the engine control section 110. a belt cleaner

33 -- the disjunction clutch 37 for cleaners -- the contact condition (the inside of drawing 1 , continuous line) to the middle imprint belt 31, and alienation -- the condition (the inside of drawing 1 , broken line) was arranged switchable, and fails to scratch the residual toner on the middle imprint belt 31 in the state of contact. The driving force of the motor 60 for a conveyance system drive is transmitted by ON of a gate clutch, and the rotation drive of gate roller pair 34 is carried out.

[0033] the secondary imprint roller 35 -- the disjunction clutch 38 for secondary imprint rollers -- the contact condition (the inside of drawing 1 , continuous line) to the middle imprint belt 31, and alienation -- a condition (the inside of drawing 1 , broken line) is switched. Secondary imprint bias predetermined in the condition of having contacted the middle imprint belt 31 is impressed, this secondary imprint roller 35 makes a transfer paper 4 imprint the secondary toner image on the middle imprint belt 31, conveying a transfer paper 4, and the contact location concerned is set as the secondary imprint sections 39.

[0034] The middle imprint belt 31 corresponds to a middle transfer medium, primary imprint roller 31A and the imprint bias generation circuit 118 (after-mentioned) correspond to primary imprint means, and the secondary imprint roller 35 and the imprint bias generation circuit 118 correspond to secondary imprint means.

[0035] The fixing unit 40 is equipped with a heating roller 41 and the pressurization roller 42, and it is fixed to the transfer paper 4 concerned in the toner image on a transfer paper 4, conveying a transfer paper 4 with a heat roller fixing method. The fixing unit 40 corresponds to a fixing means.

[0036] the upper part from the tip (the inside of drawing 1 , right end) of a sheet paper cassette 3 -- going -- the half moon-like pickup roller 61 and a feed roller pair -- 62 arranges -- having -- the 34 or secondary gate roller pair imprint roller 35 and the fixing unit 40 -- inserting -- further -- a conveyance roller pair -- 63 and a discharge roller pair -- 64 is arranged and the conveyance way (the inside of drawing 1 , alternate long and short dash line) of a transfer paper 4 is formed of these.

[0037] A pickup roller 61 is driven by the pickup solenoid. the 34 or secondary feed roller pair pair [62 and gate roller] imprint roller 35, the heating roller 41 of the fixing unit 40, and a conveyance roller pair -- 63 and a discharge roller pair -- 64 is connected with the same motor 60 for a conveyance system drive through the driving force transfer device, respectively. and a feed roller pair -- the driving force of the motor 60 for a conveyance system drive is transmitted by ON of a feed clutch, and the rotation drive of 62 is carried out. The rotational speed of the motor 60 for a conveyance system drive is switchable [to two kinds such as the 1st usual rate S1 which conveys a regular paper, and the 2nd rate S2 (<S1) which conveys pasteboard] as a bearer rate of a transfer paper 4.

[0038] feed roller pair 62 and a gate roller pair -- 34 and a conveyance roller pair -- 63 and a discharge roller pair -- 64 constitutes the conveyance means of a transfer paper 4.

[0039] The main control section 100 is equipped with the interface 102 which delivers and receives a control signal between CPU101 and external devices, such as a host computer, and the image memory 103 for memorizing the picture signal given through this interface 102 in drawing 2 . If a printing command signal including a picture signal is received through an interface 102 from an external device, CPU101 is changed into the job data of a format suitable for directions of the engine section 1 of operation, and is sent out to the engine control section 110.

[0040] The engine control section 110 is equipped with CPU111, ROM112, RAM113, etc. ROM112 memorizes the control program of CPU111 etc., and RAM113 memorizes temporarily the result of an operation by control data and CPU111 of the engine section 1 etc.

[0041] CPU111 receives the vertical-synchronization sensor 32 to Vertical Synchronizing signal Vsync for Horizontal Synchronizing signal Hsync etc. from reception and the horizontal synchronization sensor 56 as an input signal from the engine section 1. And CPU111 controls actuation of each part of the engine section 1 based on these input signals and control programs.

[0042] That is, CPU111 sends out a control signal to the motorised circuit 114 which drives the motor 36 for a photo conductor drive, and synchronizes and carries out the rotation drive of a photo conductor 11 and the middle imprint belt 31. In addition, the stepping motor is used as a motor 36 for a photo conductor drive, and the rotation drive rate of the motor 36 for a photo conductor drive is controlled by

this operation gestalt by the control pulse signal inputted.

[0043] Moreover, CPU111 sends out a control signal to the motorised circuit 115 which drives the motor 60 for a conveyance system drive, and controls conveyance of the transfer paper 4 from a sheet paper cassette 3. When a transfer paper 4 is a regular paper or a transparence sheet for OHP at this time, while conveying a transfer paper 4 at the 1st rate S1 set up beforehand, it controls so that the peripheral speed of a photo conductor 11 and the middle imprint belt 31 is in agreement with the 1st rate S1.

[0044] On the other hand, when a transfer paper 4 is the above-mentioned pasteboard, pasteboard (transfer paper) 4 is conveyed at the 2nd rate S2 ($< S1$) set up beforehand. He is trying to compensate lack of the fixing capacity produced when a transfer paper 4 is pasteboard by increasing the pass time of the transfer paper 4 in the fixing unit 40 by this. CPU111 controls so that the peripheral speed is in agreement with the 1st rate S1, while developing the photo conductor 11 about the photo conductor 11 and the middle imprint belt 31, and when set up beforehand, moderation is started, and after the development termination, the secondary imprint to a transfer paper 4 is made to perform the peripheral speed here at the 2nd rate S2. About this moderation initiation time, it mentions later.

[0045] Moreover, CPU111 sends out a control signal to the disjunction clutch drive circuit 116 which drives the disjunction clutch 37 for cleaners, and controls the alienation and the contact of a belt cleaner 33 to the middle imprint belt 31. Moreover, CPU111 sends out a control signal to the disjunction clutch drive circuit 117 which drives the disjunction clutch 38 for secondary imprint rollers, and controls the alienation and the contact of the secondary imprint roller 35 to the middle imprint belt 31.

[0046] Moreover, CPU111 sends out a control signal to the imprint bias generation circuit 118 which generates imprint bias, and controls impression of the primary imprint bias (for example, hundreds V) to primary imprint roller 31A, and impression of the secondary imprint bias (for example, several kV) to the secondary imprint roller 35.

[0047] Moreover, CPU111 controls the contents of a display of a display while receiving the contents of actuation over the actuation key of the actuation display panel 8 arranged in the front face of the body 2 of equipment. This CPU111 corresponds to a transfer-control means and a middle transfer-medium control means.

[0048] Next, actuation in case a transfer paper 4 is the above-mentioned pasteboard is explained, referring to drawing 3 - drawing 5. Drawing 3, the timing chart drawing 4 explains actuation of each part of the engine section 1 to be, and drawing 5 are drawings explaining the moderation initiation time of the middle imprint belt 31.

[0049] If the printing command signal which includes a picture signal from external devices, such as a host computer, is given to the main control section 100, according to the control signal from this main control section 100, the engine control section 110 will start actuation of each part of the engine section 1. When not in agreement with the size the size of the transfer paper 4 currently loaded into the sheet paper cassette 3 is instructed to be with the printing command signal at this time, the message which urges exchange of a sheet paper cassette to the actuation display panel 8 is displayed. In addition, although considered as the printer equipped with one sheet paper cassette 3 in drawing 1, what was not restricted to this but was equipped with two or more sheet paper cassettes may be used.

[0050] When in agreement with the size the size of the transfer paper 4 currently loaded into the sheet paper cassette 3 is instructed to be with the printing command signal The electrostatic latent image according to the above-mentioned picture signal is formed in the front face of the photo conductor 11 charged in homogeneity by the live part 12 of the laser beam 57 from the exposure unit 50. This electrostatic latent image is developed by the rotary development section 20, a toner image is formed, and the 1st order of this toner image is imprinted on the middle imprint belt 31 in the primary imprint sections 14.

[0051] That is, in drawing 3, the motor 36 for a photo conductor drive drives at the 1st rate S1, the middle imprint belt 31 rotates, and Vertical Synchronizing signal Vsync is outputted to time of day t1, t2, t3, and t4, respectively. Development bias is turned ON, while the image demand signal Vreq is outputted after predetermined time T1 from the falling time of each Vertical Synchronizing signal Vsync and formation of the electrostatic latent image corresponding to a picture signal is started synchronizing

with falling of this image demand signal Vreq.

[0052] and the time of day t1, t2, t3, and t -- the development unit of the rotary development section 20 is switched for every four, and the toner image of each color is formed in a photo conductor 11, and is imprinted by the primary middle imprint belt 31 one by one. during this period -- the secondary imprint roller 35 -- the middle imprint belt 31 -- receiving -- alienation -- since it is in a condition, the toner image of each color is piled up on the middle imprint belt 31. Development bias is turned OFF after the predetermined time T2 beforehand decided with transfer paper size from the falling time of each Vertical Synchronizing signal Vsync of time of day t1, t2, t3, and t4.

[0053] The primary color picture which the toner images Y, C, M, and K piled up is imprinted to the predetermined field on the middle imprint belt 31 by this.

[0054] Then, in drawing 4, termination of the development (formation of the toner image K) of the last electrostatic latent image starts moderation of the motor 36 for a photo conductor drive at the time of day t6 after predetermined time T3 from time of day t5 (at the falling time of Vertical Synchronizing signal Vsync). The decision procedure of this predetermined time T3 is explained. In addition, by drawing 5, time amount transition of the drive rate of the middle imprint belt 31 by the motor 36 for a photo conductor drive, and the location of the primary imprint toner image 74 on the middle imprint belt 31 and the location of the primary imprint sections 14 are made to correspond, and is shown.

[0055] The distance L1 which the time amount T5 taken to be stabilized at time amount T four taken to fall from the 1st rate S1 to the 2nd rate S2 when the motor 36 for the photo conductor drive which consists of a stepping motor starts moderation by t6 at the moderation initiation time, as shown in drawing 5, and the 2nd rate S2 is about 1 constant value, respectively, and progresses in the meantime is also about 1 constant value. These values will be decided as a known value, if a motor is decided.

[0056] Then, the tip (down-stream edge of the rotation driving direction 71) 75 of the primary imprint toner image 74 on the middle imprint belt 31 finds beforehand the elapsed time T0 from the time of day t5 which takes only distance L1 to arrive at the location of the upstream of the rotation driving direction 71 from the primary imprint sections 14, makes the value which subtracted known time amount (T-four+T5) from this elapsed time T0 predetermined time T3, and it memorizes to ROM112.

[0057] Synchronizing with t7, the tip 75 of the primary imprint toner image 74 on the middle imprint belt 31 will reach the primary imprint sections 14 certainly the time of the middle imprint belt 31 being stabilized and driving with the peripheral speed of the 2nd rate S2 by this.

[0058] In addition, in this actuation, at the moderation initiation time, to t6, the back end (upper edge of the rotation driving direction 71) 76 of the primary imprint toner image 74 already finishes passing the primary imprint sections 14, and it becomes conditions that the primary imprint at the 1st rate S1 is completed. Therefore, the overall length L of the middle imprint belt 31 needs to be set as $L > (L1+L2+L3)$. Here, as shown in drawing 5, L2 is the dimension of the rotation driving direction of the primary imprint toner image 74, and L3 is the dimension of the rotation driving direction of the primary imprint sections 14.

[0059] on the other hand, the transfer paper 4 of the maximum upper case of a transfer paper bundle currently loaded into the sheet paper cassette 3 takes out with a pickup roller 61 -- having -- a feed roller pair -- it conveys at the 2nd rate S2 by 62 -- having -- a gate roller pair -- nip is carried out to 34. and timing is doubled with the primary imprint toner image 74 on the middle imprint belt 31, and a gate clutch turns ON -- having -- a gate roller pair -- a transfer paper 4 is conveyed at the 2nd rate S2 towards the secondary [34 to] imprint section 39.

[0060] And in drawing 4, the disjunction clutch 38 for secondary imprint rollers is turned ON at the time of day t8 after predetermined time from time of day t5, and the secondary imprint roller 35 contacts the middle imprint belt 31. Subsequently, impression of the secondary imprint bias from the imprint bias generation circuit 118 to the secondary imprint roller 35 is turned ON at the time of day t9 after predetermined time from time of day t5.

[0061] By this, the secondary primary imprint toner image of a color which the toner images Y, C, M, and K on the middle imprint belt 31 piled up is imprinted by the transfer paper 4.

[0062] A gate clutch is made the OFF after taking out of a transfer paper 4, and the impression time

amount T6 of secondary imprint bias is beforehand set up according to the size of a transfer paper 4. When the impression time amount T6 of the set-up secondary imprint bias passes, while impression of secondary imprint bias is turned OFF, the disjunction clutch 38 for secondary imprint rollers is turned ON, and the secondary imprint roller 35 estranges from the middle imprint belt 31.

[0063] And in the fixing unit 40, the transfer paper 4 concerned is fixed to a secondary imprint toner image, a transfer paper 4 being conveyed. Since the transfer paper 4 is conveyed at the 2nd rate S2 lower than the 1st rate S1 at this time, sufficient fixing time amount will be secured. a transfer paper 4 -- further -- a conveyance roller pair -- it conveys by 63 -- having -- a discharge roller pair -- it is discharged by the delivery unit 7 prepared in the upper part of the body 2 of equipment by 64.

[0064] On the other hand, the disjunction clutch 37 for cleaners is turned ON at the time of day t10 after predetermined time from time of day t5, and cleaning of the residual toner on the middle imprint belt 31 is started. And the disjunction clutch 37 for cleaners is again turned ON at the time of day t12 after predetermined time from the time of day t11 which it is at the falling time of following Vertical Synchronizing signal Vsync, and a belt cleaner 33 estranges from the middle imprint belt 31.

[0065] And if the following printing command signal will be inputted through the main control section 100 from an external device by time of day t11, the motor 36 for a photo conductor drive is accelerated at the time of day t13 after predetermined time from time of day t11, from the 2nd rate S2, it will return to the 1st rate S1, and the next image formation control will be performed on the basis of the time of day t14 which it is at the falling time of following Vertical Synchronizing signal Vsync.

[0066] Thus, since he is trying to convey at the 2nd rate S2 lower than the 1st rate S1 according to this operation gestalt when a transfer paper 4 is pasteboard, sufficient fixing time amount can be secured in the fixing unit 40, and the toner image to the transfer paper 4 which is pasteboard can be established good by this.

[0067] Moreover, since he is trying to make it according to this operation gestalt re-pass with constant speed (the 2nd rate S2) in case the primary imprint toner image 74 on the middle imprint belt 31 re-passes the primary imprint sections 14, without a drive rate changing during passage, as the environmental condition between the middle imprint belts 31 and photo conductors 11 in the primary imprint sections 14 is the primary imprint toner image 74, it does not change. Therefore, it originates in the level of the reverse transcription from the middle imprint belt 31 to a photo conductor 11 changing, unevenness arises in the primary imprint toner image 74, and the situation where image quality deteriorates can be prevented beforehand.

[0068] Moreover, so that the tip 75 of the primary imprint toner image 74 on the middle imprint belt 31 may reach t7 at the primary imprint sections 14 the time of according to this operation gestalt the middle imprint belt 31 being stabilized and driving with the peripheral speed of the 2nd rate S2 Since t6 is set up at the moderation initiation time of the middle imprint belt 31 and the drive rate of the middle imprint belt 31 is maintained as much as possible at the 1st rate S1, the fall of the throughput of image formation can be controlled as much as possible.

[0069] Moreover, according to this operation gestalt, since the stepping motor is used as a motor 36 for a photo conductor drive, time amount T four taken to fall from the 1st rate S1 to the 2nd rate S2, the time amount T5 taken to be stabilized at the 2nd rate S2, and distance L1 which progresses to during this period can be made into about 1 constant value, and predetermined time T3 can be calculated with a sufficient precision by this.

[0070] In addition, this invention can add various modification to what was mentioned above unless it is not limited to the above-mentioned operation gestalt and deviated from the meaning.

[0071] For example, although the middle imprint belt 31 which consists of an endless belt joined together at the joint is used with the above-mentioned operation gestalt, the middle transfer medium of this invention may use the middle imprint belt which consists of a seamless endless belt which is not restricted to this, for example, does not have a joint, and a cylinder-like middle imprint drum.

[0072] Moreover, although t6 is set as t7 with the above-mentioned operation gestalt at the moderation initiation time of the middle imprint belt 31 the time of the middle imprint belt 31 being stabilized and driving with the peripheral speed of the 2nd rate S2 so that the tip 75 of the primary imprint toner image

74 on the middle imprint belt 31 may reach the primary imprint sections 14 It is not restricted to this, but when earlier than t_6 , you may make it start moderation at the moderation initiation time, as long as it is after a development termination time. Even in this case, the effectiveness that the situation where unevenness arises in the primary imprint toner image 74, and image quality deteriorates can be prevented beforehand can be done so.

[0073] Moreover, although the elapsed time T_1 until it outputs the image demand signal V_{req} from Vertical Synchronizing signal V_{sync} is constant value, and predetermined time T_3 is also constant value regardless of transfer paper size with the above-mentioned operation gestalt since the location at the tip 75 of the primary imprint toner image 74 is the same not related at transfer paper size, it is not restricted to this. For example, it is good also as what is [that the location of the back end (upper edge of the rotation driving direction 71) of the primary imprint toner image 74 should be made the same not related at transfer paper size] different about each transfer paper size in elapsed time until it outputs the image demand signal V_{req} from Vertical Synchronizing signal V_{sync} . In this case, what is necessary is to calculate predetermined time T_3 , respectively and just to memorize to ROM112 as a control program about each transfer paper size.

[0074] Moreover, although it is desirable to use a stepping motor as a motor 36 for a photo conductor drive as the above-mentioned operation gestalt explained, this invention is not restricted to this and may adopt other motors, such as DC brushless motor.

[0075] Moreover, although the above-mentioned operation gestalt explains the image given from external devices, such as a host computer, using the printer which prints to a transfer paper, this invention is not restricted to this but can be applied to the image formation equipment of the general electrophotography method containing a copying machine, facsimile apparatus, etc.

[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the internal configuration of the printer which is 1 operation gestalt of the image formation equipment concerning this invention.

[Drawing 2] It is the block diagram showing the electric configuration of this printer.

[Drawing 3] It is a timing chart explaining actuation of each part of the engine section.

[Drawing 4] The timing chart explaining actuation of each part of the engine section shows the continuation of drawing 3.

[Drawing 5] It is drawing explaining the moderation initiation time of a middle imprint belt.

[Description of Notations]

4 Transfer Paper

11 Photo Conductor

20 Rotary Development Section (Development Means)

31 Middle Imprint Belt (Middle Transfer Medium)

31A Primary imprint roller (primary imprint means)

35 Secondary Imprint Roller (Secondary Imprint Means)

40 Fixing Unit (Fixing Means)

71 Rotation Driving Direction

74 Primary Imprint Toner Image on Middle Imprint Belt

75 Tip of Primary Imprint Toner Image

110 Engine Control Section

111 CPU (Transfer-Control Means, Middle Transfer-Medium Control Means)

118 Imprint Bias Generation Circuit (Primary Imprint Means, Secondary Imprint Means)

S1 The 1st rate

S2 The 2nd rate

[Translation done.]